IN THE CLAIMS:

Please cancel Claim 4 without prejudice or disclaimer of subject matter and amend the claims as shown below. The claims, as pending in the subject application, read as follows:

1. (Currently Amended) A method of reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising the steps of:

providing non-blue noise properties for each respective gray level of a dot pattern generated in a pixel block of a standard size using the mask of a size corresponding to a size smaller than the standard size of the pixel block; and

generating an output image with no moiré and/or certain repetitive pattern, when the input image undergoes a gray level reproducing process and the produced image is output by an output device,

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

2. (Original) The method according to claim 1, wherein said output device has a resolution of about 600 dpi or greater.

3. (Canceled)

4. (Canceled)

5. (Original) The method according to claim 1, wherein adjacent masks are shifted along boundaries when said mask is repeatedly used and arranged two-dimensionally.

6. (Original) The method according to claim 1, wherein said mask is not a quadrilateral.

7. (Previously Presented) The method according to claim 1, wherein, as a process of determining a dot distribution at each respective gray level for producing said mask, a repulsive potential is assigned to all dots constructing a determined dot pattern of a specific gray levels and a new dot to determine a dot distribution for a next gray level is placed at a position having the lowest repulsive potential within the sum of said repulsive potentials.

8. (Previously Presented) A method according to claim 1, wherein the input image is a color image, and wherein the color image is separated into a plurality of color components and at least one of the color components of the color image is used as the input image.

9. (Currently Amended) A method of reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a

one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising the steps of:

providing non-blue noise properties for each respective gray level of a dot pattern generated by the single mask; and

generating an output image with no moiré and/or certain repetitive pattern when the input image undergoes a gray level reproducing process and the produced image is output by an output device,

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

10. (Original) The method according to claim 9, wherein said output device has a resolution of about 600 dpi or greater.

11. (Cancelled)

12. (Original) The method according to claim 9, wherein adjacent masks are shifted along boundaries when said mask is repeatedly used and arranged two-dimensionally.

13. (Original) The method according to claim 9, wherein said mask is not a quadrilateral.

14. (Previously Presented) The method according to claim 9, wherein, as a process of determining a dot distribution at each respective gray level for producing said mask, a repulsive potential is assigned to all dots constructing a determined dot pattern of a specific gray level and a new dot to determine a dot distribution for a next gray level is placed at a position having the lowest repulsive potential within the sum of said repulsive potentials.

15. (Previously Presented) A method according to claim 9, wherein the input image is a color image, and wherein the color image is separated into a plurality of color components and at least one of the color components of the color image is used as the input image.

16. (Currently Amended) A method of reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising the steps of:

providing a plurality of isolated spectra for a two-dimensional-spatial frequency spectrum of an individual dot pattern generated by a single mask at each respective gray level so that the dot pattern at each respective gray level has a non-blue noise property; and

generating an output image with no moiré and/or certain repetitive pattern when the input image undergoes a gray level reproducing process and the produced image is output by an output device.

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

17. (Original) The method according to claim 16, wherein each dot pattern generated by said mask has a noise component having small low frequency components of a one-dimensional power spectrum due to weak irregularity (perturbation) or pseudo-periodicity introduced at a plurality of gray levels.

18. (Original) The method according to claim 16, wherein said output device has a resolution of about 600 dpi or greater.

19. (Canceled)

20. (Original) The method according to claim 16, wherein adjacent masks are shifted along boundaries when said mask is repeatedly used and arranged two-dimensionally.

21. (Original) The method according to claim 16, wherein said mask is not a quadrilateral.

22. (Original) The method according to claim 16, wherein, as a process of determining a dot distribution at each respective gray level for producing said mask, a repulsive potential is assigned to all dots constructing a determined dot pattern of a specific

gray level and a new dot to determine a dot distribution for a next gray level is placed at a position having the lowest repulsive potential in/within the sum of said repulsive potentials.

23. (Previously Presented) A method according to claim 16, wherein the input image is a color image, and wherein the color image is separated into a plurality of color components and at least one of the color components of the color image is used as the input image.

24. (Currently Amended) A method of representing the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising the steps of:

composing said mask to have a size of an array of a plurality of element masks, each of which are a same size as that of a mask used in a dispersed-dot dithering method; and

generating a dot pattern by said mask, the dot pattern comprising:

(1) at least a set of element pixel blocks, each of which corresponds to each element mask and has the same dot distribution at each respective gray level;

(2) weak irregularity (perturbation) or pseudoperiodicity introduced at a certain gray level;

(3) an equal number of dots in every element pixel block at each respective gray level; ~~and~~

(4) an equal number of dots in four individual partial element pixel blocks each having a quarter size of an element pixel block at each respective (4n)th (n indicates a positive integer) gray level;

(5) a non-blue noise property at each respective gray level; and

(6) a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4dB as a maximum value of anistropy at each respective gray level.

25. (Previously Presented) The method according to claim 24, wherein said weak irregularity (perturbation) or pseudo-periodicity is introduced at a certain low gray level equal to or higher than a first gray level.

26. (Previously Presented) The method according to claim 24, wherein the size of said mask is smaller than a size corresponding to a standard size pixel block and the mask is repeatedly arranged two-dimensionally and regularly corresponding to the entire input image.

27. (Canceled)

28. (Previously Presented) The method according to claim 24, wherein said dot pattern generated in the output image has no moiré and/or certain repetitive pattern, when the input image undergoes said gray level reproducing process and the produced image is output by an output device.

29. (Original) The method according to claim 28, wherein said output device has a resolution of about 600 dpi or greater.

30. (Canceled)

31. (Original) The method according to claim 24, wherein adjacent masks are shifted along boundaries when said mask is repeatedly used and arranged two-dimensionally.

32. (Original) The method according to claim 24, wherein said mask is not a quadrilateral.

33. (Original) The method according to claim 24, wherein said weak irregularity (perturbation) or pseudo-periodicity is implemented by providing small pixel blocks, each having a number of pixels equal to or smaller than a quarter (1/4) of the total number of pixels in an element pixel block, at predetermined positions in all or a part of the individual element pixel blocks, each corresponding to each element mask, and by selecting one pixel for a dot in each of said small pixel blocks.

34. (Previously Presented) The method according to claim 24, wherein, as a process of determining a dot distribution at each respective gray level for producing said mask, a repulsive potential is assigned to all dots constructing a determined dot pattern of a specific gray level and a new dot to determine a dot distribution for a next gray level is

placed at a position having the lowest repulsive potential within the sum of said repulsive potentials.

35. (Previously Presented) A method according to claim 24, wherein the input image is a color image, and wherein the color image is separated into a plurality of color components; and at least one of the color components of the color image is used as the input image.

36. (Currently Amended) An apparatus for reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

storage means for storing the mask;

comparison means for comparing each value of the mask with a density of each pixel of the input image; and

output means for outputting a binary or multivalue dot pattern based on comparison results of said comparison means,

wherein the mask provides non-blue noise properties for each respective gray level of a dot pattern generated in a pixel block of a standard size using a mask of a size smaller than the standard size of the pixel block; ~~and~~

wherein the binary or multivalue dot pattern is generated in the output image such that no moiré and/or certain repetitive pattern is generated when the input image undergoes a gray level reproducing process and the image is output by an output device, and

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

37. (Currently Amended) An apparatus for reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

storage means for storing the mask;

comparison means for comparing each value of the mask with a density of each pixel of the input image; and

output means for outputting a binary or multivalue dot pattern based on comparison results of said comparison means,

wherein the mask provides non-blue noise properties for each respective gray level of a dot pattern generated by a single mask; ~~and~~

wherein the binary or multivalue dot pattern is generated in the output image such that no moiré and/or certain repetitive pattern is generated when an input image undergoes a gray level reproducing process and the produced image is output by an output device, and

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

38. (Currently Amended) An apparatus for reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

storage means for storing the mask;

comparison means for comparing each value of the mask with a density of each pixel of the input image; and

output means for outputting a binary or multivalue dot pattern based on comparison results of said comparison means,

wherein ~~he~~ the mask provides a plurality of isolated spectra for a two-dimensional spatial frequency spectrum of a dot pattern generated by a single mask at each respective gray level so as to the dot pattern at each respective gray level has non-blue noise property; ~~and~~

wherein the binary or multivalue dot pattern is generated in an output image such that no moiré and/or certain repetitive pattern is generated when the input image has undergone a gray level reproducing process and is output by an output device, and

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

39. (Currently Amended) An apparatus for representing the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

storage means for storing the mask;

comparison means for comparing each value of the mask with a density of each pixel of the input image; and

output means for outputting a binary or multivalue dot pattern based on comparison results of said comparison means,

wherein said mask is composed by an array of a plurality of element masks, each of which has a same size as that of a mask used in a dispersed-dot dithering method; and

wherein said mask generates a dot pattern:

(1) having at least a set of element pixel blocks, each of which corresponds to each element mask and having a same dot distribution at each respective gray level;

(2) having weak irregularity (perturbation) or pseudo-periodicity introduced at a certain gray level;

(3) having an equal number of dots in every element pixel block at each respective gray level; ~~and~~

(4) having an equal number of dots in four individual partial element pixel blocks each having a quarter (1/4) size of an element pixel block at each respective (4n)th (n indicates a positive integer) gray level;

(5) having a non-blue noise property at each respective gray level; and

(6) having a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4dB as a maximum value of anistropy at each respective gray level.

40. (Previously Presented) The apparatus according to claim 39, wherein said weak irregularity (perturbation) or pseudo-periodicity is introduced at a certain low gray level equal to or higher than a first gray level.

41. (Previously Presented) The apparatus according to claim 39, wherein the size of said mask is smaller than the size corresponding to a standard size of a pixel block and repeatedly arranged two-dimensionally and regularly corresponding to the entire input image.

42. (Currently Amended) An apparatus for reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

storage means for storing the threshold matrix;

comparison means for comparing each value of the threshold matrix with a density of each pixel of the input image; and

output means for outputting a binary or multivalue dot pattern based on comparison results of said comparison means, wherein:

said threshold matrix has a size corresponding to a size smaller than a standard size pixel block, a dot pattern generated in the standard size pixel block has non-blue noise properties at each respective gray level, and moiré and/or certain repetitive pattern are not generated in the output image when the input image undergoes a gray level reproducing process and the produced image is output by an output. device.

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

43. (Original) The apparatus according to claim 42, wherein said output device has a resolution of about 600 dpi or greater.

44. (Canceled)

45. (Currently Amended) An apparatus for reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

storage means for storing the threshold matrix;

comparison means for comparing each value of the threshold matrix with a density of each pixel of the input image; and

output means for outputting a binary or multivalue dot pattern based on comparison results of said comparison means, wherein:

said threshold matrix produces, by-itself, a dot pattern having non-blue noise properties at each respective gray level, and generates an output image with no moiré and/or certain repetitive pattern when the input image undergoes a gray level reproducing process and the produced image is output by an output device.

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

46. (Original) The apparatus according to claim 45, wherein said output device has a resolution of about 600 dpi or greater.

47. (Canceled)

48. (Currently Amended) An apparatus for reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

storage means for storing the threshold matrix;

comparison means for comparing each value of the threshold matrix with density of each pixel of the input image; and

output means for outputting a binary or multivalue dot pattern based on comparison results of said comparison means, wherein:

said threshold matrix produces, by itself, a dot pattern having a plurality of isolated spectra in a two-dimensional spatial frequency spectrum at each respective gray level so that the dot pattern at each respective gray level has a non-blue noise property and assigns a noise component having small low frequency components to a one-dimensional power spectrum of a dot distribution at a plurality of gray levels,

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

49. (Original) The apparatus according to claim 48, wherein said threshold matrix assigns said noise component by introducing weak irregularity (perturbation) or pseudo-periodicity in the dot distribution at said plurality of gray levels.

50. (Currently Amended) An apparatus for reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

storage means for storing the threshold matrix;

comparison means for comparing each value of the threshold matrix with the density of each pixel of the input image; and

output means for outputting a binary or multivalue dot pattern based on comparison results of said comparison means, wherein:

said mask has a size of an array of a plurality of element masks, each of which is a same size as that of a mask used in the a dispersed-dot dithering method, and generates a dot pattern:

(1) having at least a set of element pixel blocks, each of which corresponds to each element mask and having the same dot distribution at each respective gray level;

(2) having weak irregularity (perturbation) or pseudoperiodicity introduced at a certain gray level;

(3) having an equal number of dots in every element pixel block at each respective gray level; ~~and~~

(4) having an equal number of dots in four individual partial element pixel blocks each having a quarter (1/4) size of an element pixel block at each respective (4n)th (n indicates a positive integer) gray level;

(5) having a non-blue noise property at each respective gray level; and

(6) having a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4dB as a maximum value of anistropy at each respective gray level.

51. (Previously Presented) The apparatus according to claim 50, wherein said weak irregularity (perturbation) or pseudo-periodicity is introduced at a certain low gray level equal to or higher than a first gray level.

52. (Previously Presented) A threshold matrix (a mask) for use in converting the density of each pixel of an input image into binary or multivalue data, wherein said threshold matrix has a size corresponding to a size smaller than a standard size of a pixel block, wherein a dot pattern generated by said threshold matrix in the standard size pixel block has non-blue noise properties at each respective gray level, and moiré and/or a certain repetitive pattern are not generated in an output image when the input image undergoes a gray level reproducing process and the produced image is output by an output device.

53. (Original) The threshold matrix according to claim 52, wherein said output device has a resolution of about 600 dpi or greater.

54. (Canceled)

55. (Currently Amended) A threshold matrix (a mask) for use in converting the density of each pixel of an input image into binary or multivalue data, wherein said threshold matrix produces, by itself, a dot pattern having non-blue noise properties at each respective gray level, and generates in an output image with no moiré and/or certain repetitive pattern when the input image undergoes a gray level reproducing process and the produced image is output by an output device,

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

56. (Original) The threshold matrix according to claim 55, wherein said output device has a resolution of about 600 dpi or greater.

57. (Canceled)

58. (Currently Amended) A threshold matrix (a mask) for use in converting the density of each pixel of an input image into binary or multivalue data, wherein said threshold matrix produces, by itself, a dot pattern having a plurality of isolated spectra in a two-dimensional spatial frequency spectrum at each respective gray

level so that the dot pattern at each respective gray level has a non-blue noise property and assigns a noise component having small low frequency components to a one-dimensional power spectrum of a dot distribution at a plurality of gray levels,

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

59. (Original) The threshold matrix according to claim 58, wherein said threshold matrix assigns said noise component by introducing weak irregularity (perturbation) or pseudo-periodicity in the dot distribution at said plurality of gray levels.

60. (Currently Amended) A threshold matrix (a mask) for use in converting the density of each pixel of an input image into binary or multivalue data, wherein said mask has a size of an array of a plurality of element masks, each of which is a same size as that of a mask used in a dispersed-dot dithering method, and a generated dot pattern has:

(1) at least a set of element pixel blocks, each of which corresponds to each element mask and having the same dot distribution at each respective gray level;

(2) weak irregularity (perturbation) or pseudoperiodicity introduced at a certain gray level;

(3) an equal number of dots in every element pixel block at each respective gray level; ~~and~~

(4) an equal number of dots in four individual partial element pixel blocks each having a quarter (1/4) size of an element pixel block at each respective (4n)th (n indicates a positive integer) gray level;

(5) having a non-blue noise property at each respective gray level; and

(6) having a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4dB as a maximum value of anistropy at each respective gray level.

61. (Previously Presented) The threshold matrix according to claim 60, wherein said weak irregularity (perturbation) or pseudo-periodicity is introduced at a certain low gray level equal to or higher than the a first gray level.

62. (Currently Amended) A computer-readable storage medium storing a control program for controlling a gray level reproducing process to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

a module for comparing each value of the threshold matrix with the density of each pixel of the input image, and for controlling an output of each binary or multivalue dot pattern depending on the comparison results,

wherein, the threshold matrix has a size corresponding to a size smaller than a standard size of a pixel block, wherein a dot pattern generated, by the threshold matrix, in a pixel block of the standard size has non-blue noise properties at each respective gray level, and wherein moiré and/or a certain repetitive pattern are not generated in the output

image when the input image undergoes a gray level reproducing process and the produced image is output by an output device, and

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

63. (Original) The computer-readable storage medium according to claim 62, wherein said output device has a resolution of about 600 dpi or greater.

64. (Canceled)

65. (Currently Amended) A computer-readable storage medium storing a control program for controlling a gray level reproducing process to represent density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

a module for comparing each value of the threshold matrix with the density of each pixel of the input image, and for controlling an output of each binary or multivalue dot pattern depending on the comparison results,

wherein the threshold matrix produces, by itself, a dot pattern having non-blue noise properties at each respective gray level, and wherein moiré and/or a certain repetitive pattern are not generated when the input image undergoes a gray level reproducing process and the produced image is output by an output device.

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

66. (Original) The computer-readable storage medium according to claim 65, wherein said output device has a resolution of about 600 dpi or greater.

67. (Canceled)

68. (Currently Amended) A computer-readable storage medium storing a control program for controlling a gray level reproducing process to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

a module for comparing each value of the threshold matrix with the density of each pixel of the input image, and for controlling an output of each binary or multivalue dot pattern depending on the comparison results,

wherein the threshold matrix produces, by itself, a dot pattern having a plurality of isolated spectra in a two-dimensional spatial frequency spectrum at each respective gray level so that the dot pattern at each respective gray level has a non-blue noise property and assigns a noise component having a small low frequency component to a one-dimensional power spectrum of a dot distribution at each of a plurality of gray levels,

wherein said dot pattern generated by the mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

69. (Original) The computer-readable storage medium according to claim 68, wherein said noise component is caused by introducing weak irregularity (perturbation) or pseudo-periodicity in the dot distribution at said plurality of gray levels.

70. (Currently Amended) A computer-readable storage medium storing a control program for controlling a gray level reproducing process to reproduce the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising:

a module for comparing each value of the threshold matrix with the density of each pixel of the input image, and for controlling an output of each binary or multivalue dot pattern depending on the comparison results,

wherein the threshold matrix has a size of an array of a plurality of element masks, each of which is a same size as that of a mask used in a dispersed-dot dithering method, wherein a generated dot pattern has:

(1) at least a set of element pixel blocks each of which corresponds to each element mask and has a same dot distribution at each respective gray level;

(2) weak irregularity (perturbation) or pseudoperiodicity introduced at a certain gray level;

(3) an equal number of dots in every element pixel block at each respective gray level; ~~and~~

(4) an equal number of dots in four individual partial element pixel blocks each having a quarter (1/4) size of each element pixel block at each respective (4n)th (n indicates a positive integer) gray level;

(5) having a non-blue noise property at each respective gray level; and

(6) having a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4dB as a maximum value of anistropy at each respective gray level.

71. (Previously Presented) The computer-readable storage medium according to claim 70, wherein said weak irregularity (perturbation) or pseudo-periodicity is introduced at a certain low gray level equal to or higher than a first gray level.

72. to 74. (Canceled)